7.3 Lab Activity

**Testing Le Chatelier’s Principle**

Many chemical reactions are considered to proceed to completion, but at the molecular level nearly all chemical reactions may in principle be reversible. If the concentration of the reactants or products in a chemical reaction should change, the concentration of all other species must change in order to maintain the same value of the equilibrium constant (Kc). This idea is stated as Le Chatelier’s Principle:

*If a stress is applied to a system at chemical equilibrium, the equilibrium will shift in such a manner as to counteract the effects of that stress.*

Le Chatelier’s principle describes what happens to a system at equilibrium when disturbed and must reestablish equilibrium. In the following lab we will investigate this principle.

**Question**

How do applying stresses to particular chemical equilibria affect the system?

**Materials**

* Eye protection
* Lab apron
* Test tubes
* Droppers
* Water
* 100mL Graduated Cylinder
* 5mL Graduated Cylinder
* Concentrated HCl (ie 12M)
* 0.1M CoCl2
* 0.1M FeCl3
* 0.1M KSCN
* 0.1M AgNO3

**Procedure**

 HCl is an extremely hazardous corrosive acid.

As you carry out the following procedure, record your observations in your laboratory notebook.

Reaction #1

Co(H2O)62+(aq) + 4Cl-(aq)eqarrow CoCl42-(aq) + H2O(l)

1. Fill a test tube with 2mL of 0.1M CoCl2 and observe the result.
2. Add 3mL of HCl dropwise to the test tube containing the CoCl2.
3. Add water dropwise to the solution from step #2 until the reverse reaction is evident.
4. Write an equilibrium expression for this reaction.

Reaction #2

Fe3+(aq) + SCN-(aq)eqarrow FeSCN2+(aq)

1. If you are the first group at this station, prepare a stock solution by mixing 2mL of 0.1M FeCl3 and 0.1M KSCN in a 100-mL graduated cylinder adding H2O to bring the volume to 100mL. Save this stock solution for the rest of the class.
2. Design a procedure to demonstrate Le Chatelier’s principle satisfying the following parameters and using the above stock solution and the substances listed below:

Parameters:

Must have a change in colour.

Must have a return to original colour.

Must use all 4 solutions supplied (solutions can be used more than once).

Use 5mL or less of each solution in each step.

Solutions:

0.1M FeCl3

0.1M KSCN

0.1M AgNO3

1. Show your procedure to your teacher and have her approve your steps and amounts of solutions used in each step.
2. Conduct your procedure and record your observations.

Dispose of all solutions according to your teacher’s instructions. Clean up your work area.